

Claims

1. A centrifugal fan (110, 310, 410) that takes in gas from a rotational axis direction and blows the gas out in a direction that intersects the rotational axis (O-O),

5 comprising:

an impeller (113, 313, 413) that rotates about the rotational axis; and
a bell mouth (112, 312, 412) having an inlet (112a, 312a, 412a) arranged so
that it opposes said impeller, and a recessed part (112d, 312d, 412d) that
forms a recessed negative pressure space (S1, S2, S3) around said inlet
10 facing the impeller side, and that guides the inlet gas to said impeller.

2. The centrifugal fan (110, 310, 410) as recited in Claim 1, wherein

said bell mouth (112, 312, 412) has a flat part (112c, 312c, 412c) that extends
on the outer circumferential side of said recessed part (112d, 312d, 412d) in
15 the radial direction in a direction that intersects the rotational axis (O-O), and a
curved part (112b, 312b, 412b) that extends on the inner circumferential side
in the radial direction of said recessed part toward the impeller side, and that
forms said inlet (112a, 312a, 412a); and
the portion (C, C', C'') of said recessed part that is most recessed on the
20 impeller side is positioned on the impeller side of a connecting portion (D, D',
D'') between said flat part and said recessed part, and is positioned on the
impeller side of a connecting portion (B, B', B'') between said curved part and
said recessed part.

25 3. The centrifugal fan (110, 310, 410) as recited in Claim 2, wherein

the ratio of a length (ϕr , $\phi r'$) from the center of the rotational axis (O-O) to the
connecting portion (D, D', D'') between said flat part (112c, 312c, 412c) and
said recessed part (112d, 312d, 412d) with respect to an outer radius (ϕR ,
 $\phi R'$) of said impeller, i.e., a length ratio ($\phi r/\phi R$, $\phi r'/\phi R'$), is greater than or
30 equal to 0.8 and less than 1.4.

4. The centrifugal fan (110, 310, 410) as recited in Claim 2 or Claim 3, wherein
an angle (θ , θ') formed in the connecting portion between said flat part and
said recessed part by a plane (115, 315, 415) formed on the side opposite the
impeller by virtually extending said flat part (112c, 312c, 412c) to the inner
5 circumferential side and the surface extending from the portion (C, C', C'') of
said recessed part (112d, 312d, 412d) that is most recessed on the impeller
side to the connecting portion (D, D', D'') between said flat part and said
recessed part is greater than 60° and less than 90° .
- 10 5. The centrifugal fan (110, 310, 410) as recited in any one claim of Claim 2 through
Claim 4, wherein
the plane (115, 315, 415) formed on the side opposite the impeller by virtually
linking the connecting portion (D, D', D'') between said flat part (112c, 312c,
412c) and said recessed part (112d, 312d, 412d) with the connecting portion
15 (B, B', B'') between said curved part (112b, 312b, 412b) and said recessed
part is substantially orthogonal to the rotational axis (O-O).
6. The centrifugal fan (310) as recited in any one claim of Claim 2 through Claim 5,
wherein
20 said bell mouth (312) further has a plurality of protruding parts (312e)
arranged in the connecting portion (B') between said curved part (312b) and
said recessed part (312d) and aligned spaced apart in the circumferential
direction of said inlet (312a), and that protrude outward on the impeller side of
the connecting portion between said curved part and said recessed part.
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7. The centrifugal fan (310) as recited in Claim 6, wherein
a portion (G') of said protruding parts (312e) that protrude most on the side
opposite the impeller is positioned more on the side opposite the impeller than
a connecting portion (D') between said flat part (312c) and said recessed part
30 (312d).

8. The centrifugal fan (110, 310, 410) as recited in any one claim of Claim 1 through Claim 7, wherein

said recessed part (112d, 312d, 412d) is annularly formed so that it surrounds said inlet (112a, 312a, 412a).

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9. The centrifugal fan (110, 310) as recited in any one claim of Claim 1 through Claim 8, wherein

said impeller (113, 313) has a main plate (131, 331) that rotates about the rotational axis (O-O), a plurality of blades (133, 333) annularly arranged about the rotational axis and whose end parts on the side opposite the inlet are each fixed to said main plate, and an annular side plate (132, 332) that connects with the end parts on the inlet side of said plurality of blades; and the surface of said recessed part (112d, 312d) on the impeller side has a shape that follows along said side plate.

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10. The centrifugal fan (110, 310) as recited in Claim 9, wherein

the end part of said curved part (112b, 312b) on the impeller side is arranged on the inner circumferential side in the radial direction of the end part of said side plate (132, 332) on the inlet side, and is arranged so that it overlaps in the rotational axis direction the end part of said side plate on the inlet side.

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11. The centrifugal fan (110, 310, 410) as recited in any one claim of Claim 1 through Claim 8, further provided with:

a scroll shaped housing (111, 311, 411) having an opening (111a, 311a, 411a) formed so that it opposes said impeller (113, 313, 413), and a gas outlet (111b, 311b, 411b) formed on the outer circumferential side, and that houses said impeller;

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wherein,

said bell mouth (112, 312, 412) is provided so that said inlet (112a, 312a, 412a) opposes said opening of said housing.

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12. The centrifugal fan (110, 310) as recited in Claim 9 or Claim 10, further provided with:

a scroll shaped housing (111, 311) having an opening (111a, 311a) formed so that it opposes said impeller (113, 313), and a gas outlet (111b, 311b) formed on the outer circumferential side, and that houses said impeller;

wherein,

said bell mouth (112, 312) is provided so that said inlet (112a, 312a) opposes said opening of said housing; and

interblade parts (134, 334) positioned between each of said plurality of blades (133, 333) of said main plate (131, 331) are cut out at least at the blade front part in the rotational direction of the blade.